# **2D SHAPES**

## A PLANE GEOMETRY

#### A.1 FINDING THE SIDES

Ex 1: How many sides does this shape have?



Answer: Count each straight line to find the number of sides.









4 sides







Answer: Count each straight line to find the number of sides.

4 sides





Answer: Count each straight line to find the number of sides.



Ex 5: How many sides does this shape have?



Answer: Count each straight line to find the number of sides.







Answer: Count each straight line to find the number of sides.



### A.2 FINDING THE VERTICES





Answer: Count each point where two sides meet



Ex 8: How many vertices does this shape have?



Answer: Count each point where two sides meet.



Ex 9: How many vertices does this shape have?



Answer: Count each point where two sides meet.

4 vertices

Ex 10: How many vertices does this shape have?



Answer: Count each point where two sides meet.



Ex 11: How many vertices does this shape have?



Answer: Count each point where two sides meet.



Ex 12: How many vertices does this shape have?



Answer: Count each point where two sides meet.

4 vertices



### **B** CIRCLES

#### **B.1 FINDING DIAMETERS**

**Ex 13:** What is the radius and what is the diameter of this circle?





Answer:

- The drawn segment is a radius of length 2 cm. Radius = 2 cm
- The diameter of the circle is twice the radius.

$$d = 2 \times r$$
$$= 2 \times 2 \text{ cm}$$
$$= 4 \text{ cm}$$

Diameter = 4 cm

**Ex 14:** The wheel of a child's bicycle is a circle with a radius of 15 cm. What is its diameter?





Answer:

 $\bullet\,$  The radius of the wheel is 15 cm.



• The diameter of the circle is twice the radius.





**Ex 15:** A pizza is a circle with a radius of 15 cm. What is its diameter?





Diameter = 30 cm

Answer:

 $\bullet\,$  The radius of the pizza is 15 cm.



• The diameter of the circle is twice the radius.



Diameter = 30 cm

**Ex 16:** The Earth is a sphere with a radius of 6,000 km. What is its diameter?





Answer:

• The radius of the Earth is 6,000 km.



• The diameter is twice the radius.

 $d = 2 \times r$ = 2 × 6,000 km = 12,000 km

Diameter = 12,000 km



#### **B.2 FINDING RADII**

**Ex 17:** What is the radius and what is the diameter of this circle?



Answer:

- The drawn segment is a diameter of length 4 cm. Diameter = 4 cm
- The radius of the circle is half the diameter.

$$r = d \div 2$$
$$= 4 \text{ cm} \div 2$$
$$= 2 \text{ cm}$$

Radius = 2 cm

**Ex 18:** The wheel of a child's bicycle is a circle with a diameter of 30 cm. What is its radius?





Radius = 
$$15$$
 cm

Answer:

• The diameter of the wheel is 30 cm.



• The radius of the circle is half the diameter.



 ${\rm Radius}=15~{\rm cm}$ 

**Ex 19:** A pizza is a circle with a diameter of 30 cm. What is its radius?





Answer:

 $\bullet\,$  The diameter of the pizza is 30 cm.



• The radius of the circle is half the diameter.

$$r = d \div 2$$
  
= 30 cm ÷ 2  
= 15 cm



 ${\rm Radius}=15~{\rm cm}$ 

**Ex 20:** The Earth is a circle with a diameter of 12,000 km. What is its radius?



Radius = 6,000 km

Answer:

 $\bullet\,$  The diameter of the Earth is 12,000 km.



• The radius is half the diameter.

 $r = d \div 2$ = 12,000 km ÷ 2 = 6,000 km





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# B.3 CONSTRUCTING CIRCLE WITH A RULER AND COMPASS

**Ex 21:** Construct a circle with a radius of 2 cm at center O, using a compass.

Students should draw a circle with approximately a radius of 2 cm with center O. The most important thing is that the circle looks like a circle and the construction marks, such as the compass setting, are visible in the space below.

**Ex 22:** Construct a circle with a radius of 3 cm at center O, using a compass.

Students should draw a circle with approximately a radius of 3 cm with center O. The most important thing is that the circle looks like a circle.

Answer: To construct a circle with a radius of 3 cm at center O:

1. Draw a point O.

 $\overset{\bullet}{O}$ 

Answer: To construct a circle with a radius of 2 cm at center O:

- 1. Draw a point O.
- 2. Set your compass to a radius of 2 cm. To do this, open your compass so the distance between the pencil tip and the needle is 2 cm. You can measure this distance using your ruler.



3. Place the needle of your compass on point *O*. Hold the compass steady and carefully rotate the pencil around *O* to draw the full circle with a radius of 2 cm.



2. Set your compass to a radius of 3 cm. To do this, open your compass so the distance between the pencil tip and the needle is 3 cm. You can measure this distance using your ruler.



3. Place the needle of your compass on point O. Hold the compass steady and rotate the pencil around O to draw the full circle with a radius of 3 cm.



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**Ex 23:** Construct a circle with a radius of 2.5 cm at center O, using a compass.

Students should draw a circle with approximately a radius of 2.5 cm with center O. The most important thing is that the circle looks like a circle and the construction marks, such as the compass setting, are visible in the space below.

Answer: To construct a circle with a radius of 2.5 cm at center O:

- 1. Draw a point O.
- 2. Set your compass to a radius of 2.5 cm. To do this, open your compass so the distance between the pencil tip and the needle is 2.5 cm. You can measure this distance using your ruler.

3. Place the needle of your compass on point O. Hold the compass steady and carefully rotate the pencil around O to draw the full circle with a radius of 2.5 cm.

2

0 cm 1

.....

5

3



# C POLYGONS

### C.1 IDENTIFYING POLYGONS

MCQ 24: Is this figure a polygon?



Pick the correct answer:

 $\Box$  Yes

🖾 No

Answer: A polygon is a closed shape with straight sides. This figure is not a polygon because the lines do not connect at any point, so the shape is not closed.

MCQ 25: Is this figure a polygon?



Pick the correct answer:

- $\boxtimes$  Yes
- $\square$  No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is a polygon because it is closed, has straight lines, and its lines do not cross.

MCQ 26: Is this figure a polygon?



Pick the correct answer:

 $\Box$  Yes

 $\boxtimes$  No

Answer: A polygon is a closed shape with straight sides that do not cross. This figure is not a polygon because its lines cross each other.

MCQ 27: Is this figure a polygon?



Pick the correct answer:



 $\Box$  Yes

 $\boxtimes$  No

#### C.2 NAMING POLYGONS

MCQ 31: What is the name of this polygon?

Answer: A polygon is a closed shape with only straight sides. This figure is not a polygon because it has a curved line.

MCQ 28: Is this figure a polygon?



Pick the correct answer:

 $\boxtimes$  Yes

 $\square$  No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is a polygon because it is closed, has straight lines, and its lines do not cross.

MCQ 29: Is this figure a polygon?



Pick the correct answer:

 $\Box$  Yes

 $\boxtimes$  No

Answer: A polygon is a closed shape with only straight sides that do not cross. This figure is not a polygon because its lines cross each other.

MCQ 30: Is this figure a polygon?



Pick the correct answer:

- $\Box$  Yes
- $\boxtimes$  No

Answer: A polygon is a closed shape with only straight sides. This figure is not a polygon because the lines do not connect at any point, so the shape is not closed.



Pick the correct answer:

- $\Box$  Triangle
- $\Box$  Quadrilateral
- $\boxtimes$  Pentagon
- □ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 5 sides, so it is a pentagon.

MCQ 32: What is the name of this polygon?



Pick the correct answer:

- $\boxtimes$  Triangle
- $\Box$  Quadrilateral
- $\Box$  Pentagon
- $\Box$  Hexagon

Answer: A polygon is named by the number of its sides. This figure has 3 sides, so it is a triangle.

MCQ 33: What is the name of this polygon?



Pick the correct answer:

- □ Triangle
- $\boxtimes$  Quadrilateral
- $\Box$  Pentagon
- $\Box$ Hexagon

Answer: A polygon is named by the number of its sides. This figure has 4 sides, so it is a quadrilateral.

MCQ 34: What is the name of this polygon?





Pick the correct answer:

- $\Box$  Triangle
- $\hfill\square$ Quadrilateral
- $\Box$  Pentagon
- $\boxtimes$  Hexagon

Answer: A polygon is named by the number of its sides. This figure has 6 sides, so it is a hexagon.

MCQ 35: What is the name of this polygon?



Pick the correct answer:

- $\Box$  Triangle
- $\boxtimes$  Quadrilateral
- $\Box$  Pentagon
- $\Box$  Hexagon

Answer: A polygon is named by the number of its sides. This figure has 4 sides, so it is a quadrilateral.

#### C.3 DRAWING POLYGONS

**Ex 36:** Draw a triangle with 3 straight sides that connect to form a closed shape.

Students should draw a triangle with exactly 3 straight sides that connect at their ends to form a closed shape. The lines should not cross each other and should be drawn neatly, preferably using a ruler to ensure straightness. The triangle can be any size or shape (e.g., scalene, isosceles, or equilateral) as long as it has 3 sides and is closed.

Answer: A triangle is a polygon with 3 sides. To draw a triangle, connect three straight lines to form a closed shape with no crossing lines. For example:



**Ex 37:** Draw a quadrilateral with 4 straight sides that connect to form a closed shape.

Students should draw a quadrilateral with exactly 4 straight sides that connect at their ends to form a closed shape. The lines should not cross each other and should be drawn neatly, preferably using a ruler to ensure straightness. The quadrilateral can be any size or shape (e.g., trapezium, parallelogram, or irregular) as long as it has 4 sides and is closed.

*Answer:* A quadrilateral is a polygon with 4 sides. To draw a quadrilateral, connect four straight lines to form a closed shape with no crossing lines. For example:



**Ex 38:** Draw a pentagon with 5 straight sides that connect to form a closed shape.

Students should draw a pentagon with exactly 5 straight sides that connect at their ends to form a closed shape. The lines should not cross each other and should be drawn neatly, preferably using a ruler to ensure straightness. The pentagon can be any size or shape (e.g., regular with equal sides or irregular with different side lengths) as long as it has 5 sides and is closed.

*Answer:* A pentagon is a polygon with 5 sides. To draw a pentagon, connect five straight lines to form a closed shape with no crossing lines. For example:



**Ex 39:** Draw a hexagon with 6 straight sides that connect to form a closed shape.

Students should draw a hexagon with exactly 6 straight sides that connect at their ends to form a closed shape. The lines should not cross each other and should be drawn neatly, preferably using a ruler to ensure straightness. The hexagon can be any size or shape (e.g., regular with equal sides or irregular with different side lengths) as long as it has 6 sides and is closed.

*Answer:* A hexagon is a polygon with 6 sides. To draw a hexagon, connect six straight lines to form a closed shape with no crossing lines. For example:



#### **D** TRIANGLES

#### D.1 CLASSIFYING TRIANGLES BY SIDE LENGTHS

MCQ 40: Classify the triangle:





Choose one answer:

- $\boxtimes$  Scalene
- $\Box$  Isosceles
- $\Box$  Equilateral
- $\Box$  Right-angle

Answer: The triangle is scalene because its sides are 4 cm, 3 cm, and 2 cm, which are all different lengths.

MCQ 41: Classify the triangle:



Choose two answers:

- $\Box\,$  Scalene
- $\boxtimes$  Isosceles
- $\boxtimes$  Equilateral
- $\Box$  Right-angle

Answer: The triangle is equilateral because all three sides are 3 cm long. It is also isosceles because an equilateral triangle has at least two equal sides.





- $\Box$ Scalene
- $\boxtimes$  Isosceles
- $\Box$  Equilateral
- $\Box$  Right-angle

Answer: The triangle is isosceles because two sides are 5 cm and one side is 3 cm, so exactly two sides have the same length.

MCQ 43: Classify the triangle:



Choose one answer:

- $\boxtimes$  Scalene
- $\Box$  Isosceles
- $\Box$  Equilateral
- $\Box$  Right-angle

Answer: The triangle is scalene because its sides are 6 cm, 5 cm, and 2 cm, which are all different lengths.

MCQ 44: Classify the triangle:



Choose one answer:

- $\Box$  Scalene
- ⊠ Isosceles
- $\Box$  Equilateral
- $\hfill\square$  Right-angle

Answer: The triangle is isosceles because two sides are 5 cm and one side is 3 cm, so exactly two sides have the same length.

#### MCQ 45: Classify the triangle:



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Choose one answer:

- $\Box$  Scalene
- $\Box$  Isosceles
- $\boxtimes$  Equilateral
- $\Box$  Right-angle

 ${\scriptstyle Answer:}$  The triangle is equilateral because all three sides are 4 cm long.

#### $\mathbf{MCQ}$ 46: Classify the triangle:



Choose one answer:

- $\Box$  Scalene
- $\Box$  Isosceles
- $\Box$  Equilateral
- $\boxtimes$  Right-angle

Answer: The triangle is right-angle.

 $\mathbf{MCQ}$  47: Classify the triangle:



Choose one or two answers:

- $\Box$ Scalene
- $\boxtimes$  Isosceles
- $\Box$  Equilateral
- $\boxtimes$  Right-angle

Answer: The triangle is right-angle and isosceles.

# D.2 CONSTRUCTING TRIANGLES WITH A RULER AND COMPASS

**Ex 48:** Construct a triangle ABC with AB = 3 cm, AC = 6 cm, and BC = 5 cm, leaving the construction marks visible, using a ruler and a compass.

Students should draw a triangle with sides approximately AB = 3 cm, AC = 6 cm, and BC = 5 cm. The most important thing is that the construction marks, such as the arcs made with the compass, are visible.

Answer: To construct a triangle ABC with AB = 3 cm, AC = 6 cm, and BC = 5 cm:

1. Draw the segment  $\overline{AB}$  of length 3 cm using your ruler.

 $3~{\rm cm}$ 

2. Draw an arc with center A and radius 6 cm using your compass.



3. Draw an arc with center B and radius 5 cm using your compass.



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4. Mark the point C at the intersection of the two arcs, then draw the segments  $\overline{AC}$  and  $\overline{BC}$  using your ruler.



**Ex 49:** Construct a triangle ABC with AB = 4 cm, AC = 3 cm, and BC = 5 cm, leaving the construction marks visible,

Students should draw a triangle with sides approximately AB =

4 cm, AC = 3 cm, and BC = 5 cm. The most important thing

is that the construction marks, such as the arcs made with the

using a ruler and a compass.

compass, are visible.



4. Mark the point C at the intersection of the two arcs, then draw the segments  $\overline{AC}$  and  $\overline{BC}$  using your ruler.



**Ex 50:** Construct an equilateral triangle ABC with AB = 4 cm, leaving the construction marks visible, using a ruler and a compass.

Students should draw an equilateral triangle with sides approximately AB = 4 cm, BC = 4 cm, and CA = 4 cm. The most important thing is that the construction marks, such as the arcs made with the compass, are visible.

Answer: To construct a triangle ABC with AB = 4 cm, AC = 3 cm, and BC = 5 cm:

1. Draw the segment  $\overline{AB}$  of length 4 cm using your ruler.

 $4 \mathrm{~cm}$ 

2. Draw an arc with center A and radius 3 cm using your compass.





3. Draw an arc with center B and radius 5 cm using your compass.

Answer: To construct an equilateral triangle ABC with AB = 4 cm:

1. Draw the segment  $\overline{AB}$  of length 4 cm using your ruler.



2. Draw an arc with center A and radius 4 cm using your compass.





3. Draw an arc with center B and radius 4 cm using your compass.



4. Mark the point C at the intersection of the two arcs, then draw the segments  $\overline{AC}$  and  $\overline{BC}$  using your ruler.



**Ex 51:** Construct an isosceles triangle ABC with AB = 4 cm, AC = 3 cm, and BC = 3 cm, leaving the construction marks visible, using a ruler and a compass.

Students should draw an isosceles triangle with sides approximately AB = 4 cm, AC = 3 cm, and BC = 3 cm. The most important thing is that the construction marks, such as the arcs made with the compass, are visible.

Answer: To construct an isosceles triangle ABC with AB = 4 cm, AC = 3 cm, and BC = 3 cm:

1. Draw the segment  $\overline{AB}$  of length 4 cm using your ruler.



2. Draw an arc with center A and radius 3 cm using your compass.



3. Draw an arc with center B and radius 3 cm using your compass.



4. Mark the point C at the intersection of the two arcs, then draw the segments  $\overline{AC}$  and  $\overline{BC}$  using your ruler.



## **E** QUADRILATERALS

# E.1 DETERMINING PROPERTIES OF QUADRILATERALS

MCQ 52: A square has four right angles. Choose one answer:

- $\boxtimes~{\rm True}$
- $\Box\,$  False

Answer: The statement "A square has four right angles" is true. A square has four right angles, which are 90 degrees.



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MCQ 53: The opposite sides of a rhombus are parallel. Choose one answer:

⊠ True

 $\Box$  False

Answer: The statement "The opposite sides of a rhombus are parallel" is true. A rhombus has opposite sides that are parallel to each other.



MCQ 54: The adjacent sides of a rectangle are parallel. Choose one answer:

 $\Box$  True

 $\boxtimes$  False

Answer: The statement "The adjacent sides of a rectangle are parallel" is false. In a rectangle, adjacent sides are not parallel because they meet at right angles (90 degrees). Only the opposite sides are parallel.



MCQ 55: A square is a special type of rectangle. Choose one answer:

🛛 True

 $\Box$  False

Answer: The statement "A square is a special type of rectangle" is true. A square is a special type of rectangle because it has four right angles and all sides are the same length.



MCQ 56: A rectangle is a special type of square. Choose one answer:

□ True

 $\boxtimes$  False

Answer: The statement "A rectangle is a special type of square" is false. A rectangle is not a special type of square because a rectangle can have sides of different lengths, while a square must have all sides the same length.



MCQ 57: A rectangle is a special type of parallelogram. Choose one answer:

⊠ True

 $\Box$  False

Answer: The statement "A rectangle is a special type of parallelogram" is true. A rectangle is a special type of parallelogram because its opposite sides are parallel.



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